

CLAIMS

1. A method of manufacturing a semiconductor device in which a semiconductor chip on which electrodes are formed, and a substrate on which an interconnect pattern is formed and which is covered by a protective layer except a region in said interconnect pattern of electrical connection with said electrodes, are connected by an adhesive, said method comprising:

5 a first step of providing said adhesive on said substrate from a region of mounting of said semiconductor chip to said protective layer, between said interconnect pattern and said electrodes; and

10 a second step of adhering said substrate to said semiconductor chip by means of said adhesive to electrically connect said interconnect pattern with said electrodes.

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2. The method of manufacturing a semiconductor device as defined in claim 1,

20 wherein said interconnect pattern and said electrodes are electrically connected by conductive particles dispersed in said adhesive.

25 3. The method of manufacturing a semiconductor device as defined in claim 1,

wherein before said first step, said adhesive is previously disposed on the surface of said semiconductor chip

on which said electrodes are formed.

4. The method of manufacturing a semiconductor device as defined in claim 1,

5 wherein before said first step, said adhesive is previously disposed on the surface of said substrate on which said interconnect pattern is formed.

10 5. The method of manufacturing a semiconductor device as defined in claim 1, wherein said adhesive is a thermosetting adhesive.

6. The method of manufacturing a semiconductor device as defined in claim 5,

15 wherein said adhesive is spread out beyond said semiconductor chip in said first step; and

wherein heat is applied between said semiconductor chip and said substrate to cure said adhesive between said semiconductor chip and said substrate in said second step;

20 said manufacturing method further comprising a third step of applying heat to a part of said adhesive not completely cured in said second step.

25 7. The method of manufacturing a semiconductor device as defined in claim 6, wherein said adhesive is heated by means of a heating jig in said third step.

8. The method of manufacturing a semiconductor device as defined in claim 7,

wherein a nonadhesive layer having improved nonadhesive properties with respect to said adhesive is interposed between
5 said heating jig and said adhesive, before heating said adhesive.

9. The method of manufacturing a semiconductor device as defined in claim 8, wherein said nonadhesive layer is provided
10 on said heating jig.

10. The method of manufacturing a semiconductor device as defined in claim 8, wherein said nonadhesive layer is provided
15 on said adhesive.

11. The method of manufacturing a semiconductor device as defined in claim 6, wherein said adhesive is heated by a non-contact method in said third step.

20 12. The method of manufacturing a semiconductor device as defined in claim 6,

further comprising a reflow step of forming solder balls on said substrate to be connected to said interconnect pattern,
wherein said third step is carried out in said reflow
25 step.

13. The method of manufacturing a semiconductor device as

defined in claim 6,

further comprising a reflow step of electrically connecting an electronic component other than said semiconductor chip to said interconnect pattern,

5 wherein said third step is carried out in said reflow step.

14. The method of manufacturing a semiconductor device as defined in claim 1,

10 wherein said substrate is cut together with said adhesive in a region not in contact with said semiconductor chip, after said second step.

15. The method of manufacturing a semiconductor device as defined in claim 14,

15 wherein said substrate is cut in a region outside the edge of said interconnect pattern.

16. The method of manufacturing a semiconductor device as defined in claim 14,

20 wherein the whole of said adhesive is cured before said substrate is cut together with said cured adhesive.

17. The method of manufacturing a semiconductor device as defined in claim 1,

25 wherein said adhesive is caused to surround at least a part of a lateral surface of said semiconductor chip in said

second step.

18. The method of manufacturing a semiconductor device as defined in claim 17,

5 wherein said adhesive is provided in said first step at a thickness greater than the interval between said semiconductor chip and said substrate after said second step, and is spread out beyond said semiconductor chip by applying pressure between said semiconductor chip and said substrate in
10 said second step.

19. The method of manufacturing a semiconductor device as defined in claim 1,

15 wherein said adhesive includes a shading material.

20. The method of manufacturing a semiconductor device as defined in claim 1,

20 wherein said substrate is provided previously covered by said protective layer except a region of mounting of said semiconductor chip and the periphery of said mounting region.

21. A semiconductor device comprising:

25 a semiconductor chip having electrodes; a substrate on which an interconnect pattern is formed; a protective layer provided on said substrate excluding a region of said interconnect pattern of electrical connection with said electrodes of said semiconductor chip; and an adhesive;

wherein said adhesive is provided on said substrate from a region of mounting of said semiconductor chip to said protective layer; and

5 wherein said electrodes of said semiconductor chip are electrically connected with said interconnect pattern.

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22. The semiconductor device as defined in claim 21,
wherein conductive particles are dispersed in said adhesive to form an anisotropic conductive material.

10 23. The semiconductor device as defined in claim 22,
wherein said anisotropic conductive material is provided to cover the whole of said interconnect pattern.

15 24. The semiconductor device as defined in claim 21,
wherein said adhesive covers at least a part of a lateral surface of said semiconductor chip.

20 25. The semiconductor device as defined in claim 21,
wherein said adhesive includes a shading material.

25 26. The semiconductor device as defined in claim 21,
wherein said protective layer is provided to cover said substrate except a region of mounting of said semiconductor chip and the periphery of said mounting region.

27. A semiconductor device manufactured by the method as

A
defined in ^{claim 1} ~~any of claims 1 to 20~~.

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28. A circuit board on which is mounted the semiconductor device as defined in ^{claim 21} ~~any of claims 21 to 26~~.

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29. An electronic instrument having the circuit board as defined in claim 28.

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